

Notice of Allowability

Application No.

10/518,125

Examiner

Tiffany A. Fetzner

Applicant(s)

KRUSPE ET AL.

Art Unit

2859

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 1/08/2007, 2/15/2007 & the telephonic interview of 2/16/2007.
2. ☒ The allowed claim(s) is/are Examiner amended claims 19-42.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 2/17/2007.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Examiner's Amendment

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.
2. Authorization for this examiner's amendment was given in a telephone interview with **Attorney Kaushik P. Sriram Reg. No. 43,150 on Feb. 16th 2007** along with authorization to charge any necessary fees to applicant's deposit account.
3. The application has been amended as follows:

A) Replace claims 19 through 25 of the December 15th 2004 Preliminary Amendment with the following Examiner amended claims 19 through 25:

Claim 19 --- An apparatus **configured** for evaluating electrical properties of an earth formation surrounding a borehole, the apparatus comprising:

- (a) a transmitting antenna assembly **configured to convey** a radio frequency electromagnetic field into said earth formation; and
- (b) a receiving antenna assembly **configured to receive** a signal resulting from interaction of said electromagnetic field with said earth formation;

wherein at least one of the antenna assemblies includes at least one of:

- (I) a magnetic core formed from a material having high internal magnetostrictive damping, and,
- (II) **a magnetic core formed from a material having low** magnetostriction.

Claim 20 ---The apparatus of **claim 19** wherein said **core** material has a high internal damping and further comprises a powdered soft magnetic material. ---

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Claim 21 ---The apparatus of **claim 20** wherein the powdered soft magnetic material is non-conductive and has a maximum grain size to substantially reduce intragranular power loss at a frequency of said radio frequency **electromagnetic** field. ---

Claim 22 ---The apparatus of **claim 20** wherein the powdered soft magnetic material has a maximum grain size less than half a wavelength of an acoustic wave having a frequency of said radio frequency **electromagnetic** field. ---

Claim 23 ---The apparatus of **claim 19** wherein said material of the **magnetic core** has a high internal damping and further has a large area within a hysteresis loop associated with magnetostrictive deformation of the material. ---

Claim 24 ---The apparatus of **claim 20** wherein said core further comprises a non-conductive bonding agent having substantial acoustic decoupling between grains. ---

Claim 25 ---The apparatus of **claim 19** wherein said apparatus is **further configured** to be conveyed on one of: (i) a wireline, and, (ii) a drilling tubular. ---

B) Insert claims 26, 27 and 28 of the December 15th 2004 Preliminary Amendment:

Claim 26 ---The apparatus of **claim 19** wherein said material has a low magnetostriction and comprises an amorphous metal. ---

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Claim 27 --- A method of determining a resistivity parameter of an earth formation surrounding a borehole, the method comprising:

- (a) using a transmitting antenna assembly on a tool conveyed in said borehole for transmitting a radio frequency electromagnetic field into said earth formation;
- (b) using a receiving antenna assembly for receiving a signal resulting from interaction of said electromagnetic field with said earth formation;
- (c) using a core for at least one of the antenna assemblies for enhancing the received signals, said core formed from a material having at least one of
 - (I) high internal magnetostrictive damping; and,
 - (II) low magnetostriction. ---

Claim 28 ---The method of **claim 27** wherein said material has a high internal damping, the method further comprising using a powdered soft magnetic material as said material with high internal damping. ---

C) Replace claims 29 through 30 of the December 15th 2004 Preliminary Amendment with the following Examiner amended claims 29 and 30:

Claim 29 ---The method of **claim 28** further comprising selecting the powdered soft magnetic material to be substantially non-conductive and having a maximum grain size to substantially reduce intragranular power loss at a frequency of said radio frequency **electromagnetic** field. ---

Claim 30 ---The method of **claim 28** further comprising selecting the powdered soft magnetic material as having a maximum grain size less than half a wavelength of an acoustic wave having a frequency of said radio frequency **electromagnetic** field. ---

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D) Insert claims 31 through 34 of the December 15th 2004 Preliminary Amendment:

Claim 31 ---The method of **claim 27** wherein said material has high internal damping, the method further comprising selecting said material as having a large area within a hysteresis loop associated with magnetostrictive deformation of the material. ---

Claim 32 ---The method of **claim 28** further comprising using in said at least one antenna core a non-conductive bonding agent having substantial acoustic decoupling between grains. ---

Claim 33 ---The method of **claim 27** wherein said core material has a low magnetostriction, the method further comprising selecting an amorphous metal for use as said material. ---

Claim 34 ---The method of **claim 27** wherein said tool is conveyed into the borehole on one of
(i) a wireline, and,
(ii) a drilling tubular. ---

E) Replace claims 35 and 36 of the December 15th 2004 Preliminary Amendment with the following Examiner amended claims 35 and 36:

Claim 35 ---An apparatus **configured** for evaluating electrical properties of an earth formation surrounding a borehole, the apparatus comprising:

(a) a transmitting antenna assembly **configured to convey** an electromagnetic field into said earth formation, **the transmitter antenna assembly including a transmitter coil**; and

(b) a receiving antenna assembly **configured to receive** a signal resulting from interaction of said electromagnetic field with said earth formation;

wherein at least one of said antenna assemblies includes at least a magnetic core formed from a non-ferritic powdered soft magnetic material having high saturation flux density and a non-conductive bonding agent, said magnetic core having a magnetic permeability μ less than 500 and wherein said saturation flux density is greater than about **0.4 T**. ---

Claim 36 ---The apparatus of **claim 35**, wherein the magnetic core **has** dimensions, which are related to the direction of an RF electromagnetic field, produced by the transmitter coil and to the magnetic permeability of the powdered soft magnetic material. ---

F) Insert claim 37 of the December 15th 2004 Preliminary Amendment:

Claim 37 ---The apparatus of claim 35 wherein the powdered soft magnetic material is conductive and has a maximum grain size to substantially prevent intragranular power loss of said transmitted electromagnetic signal. ---

G) Replace claim 38 of the December 15th 2004 Preliminary Amendment with the following Examiner amended claim 38:

Claim 38 ---The apparatus of **claim 35** wherein an effective demagnetizing factor of the magnetic core in a direction of the radio frequency **electromagnetic** field substantially exceeds the inverse magnetic permeability of the powdered soft magnetic material. ---

H) Insert claims 39 through 41 of the December 15th 2004 Preliminary Amendment:

Claim 39 ---The apparatus of **claim 36**, wherein the core has an effective permeability, μ , less than 5, as defined by a first equation,

$$\mu = 1 + (\mu_m - 1) / ((\mu_m - 1) \times D + 1),$$

wherein **D**, the demagnetizing factor can be estimated from an elliptic equivalent of the cross-section of the core, as defined by a second equation,

$$D = S_x / (S_x + S_y),$$

wherein **S_x** and **S_y** represent the elliptic equivalent dimensions in horizontal and vertical dimensions respectively, in a plane the core. ---

Claim 40 ---The apparatus as defined in **claim 35** wherein the powdered soft magnetic material possesses a maximum magnetic permeability given a predetermined maximum RF antenna power loss. ---

Claim 41 ---The apparatus of **claim 35** wherein said flux density is greater than that of a magnetic core consisting primarily of ferrite. ---

I) **Replace claim 42 of the December 15th 2004 Preliminary Amendment with the following Examiner amended claim 42:**

Claim 42 ---The apparatus of **claim 35** wherein the magnetic core further comprises relative dimensions that are related to the direction of the RF electromagnetic field and to the magnetic permeability of the powdered soft magnetic material. ---

The following is an examiner's statement of Reasons for Allowance:

4. With respect to **Examiner amended independent claims 19** and its associated **dependent claims 20-26**, these claims are considered to be allowable over the prior art of record because the prior art of record neither discloses nor suggests an apparatus configured for evaluating electrical properties of an earth formation surrounding a borehole comprising the combinational features of:

(a) a transmitting antenna assembly configured to convey a radio frequency electromagnetic field into said earth formation; and
(b) a receiving antenna assembly configured to receive a signal resulting from interaction of said electromagnetic field with said earth formation; wherein at least one of the antenna assemblies includes at least one of: (I) a magnetic core formed from a material having high internal magnetostrictive damping, and, (II) a magnetic core formed from a material having low magnetostriction", from the **examiner amended independent claim 19**, in combination with the remaining limitations of each of the associated dependent claims, of **examiner amended dependent or dependent claims 20-26**. It is the entire combination of the claim limitations taken as a whole that constitutes both the novelty and non-obviousness of applicant's claims.

5. With respect to **Examiner amended independent claims 27** and its associated **dependent claims 28-34** these claims are considered to be allowable over the prior art of record because the prior art of record neither discloses nor suggests a method

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comprising "determining a resistivity parameter of an earth formation surrounding a borehole, the method comprising:

(a) using a transmitting antenna assembly on a tool conveyed in said borehole for transmitting a radio frequency electromagnetic field into said earth formation;

(b) using a receiving antenna assembly for receiving a signal resulting from interaction of said electromagnetic field with said earth formation;

(c) using a core for at least one of the antenna assemblies for enhancing the received signals, said core formed from a material having at least one of (I) high internal magnetostrictive damping, and, (II) low magnetostriction," from the **examiner amended independent claim 27**, in combination with the remaining limitations of each of the associated dependent claims, of **examiner amended dependent or dependent claims 28-34**. It is the entire combination of the claim limitations taken as a whole that constitutes both the novelty and non-obviousness of applicant's claims.

6. With respect to **Examiner amended independent claims 35** and its associated **dependent claims 36-42** are considered to be allowable over the prior art of record because the prior art of record neither discloses nor suggests an apparatus configured for evaluating electrical properties of an earth formation surrounding a borehole, the apparatus comprising: (a) a transmitting antenna assembly configured to convey an electromagnetic field into said earth formation, the transmitter antenna assembly including a transmitter coil; and (b) a receiving antenna assembly configured to receive a signal resulting from interaction of said electromagnetic field with said earth formation; wherein at least one of said antenna assemblies includes at least a magnetic core formed from a non-ferritic powdered soft magnetic material having high saturation flux density and a non-conductive bonding agent, said magnetic core having a magnetic permeability μ less than 500 and wherein said saturation flux density is greater than about 0.4 T," from the **examiner amended independent claim 35**, in combination with the remaining limitations of each of the associated dependent claims, of **examiner amended dependent or dependent claims 36-42**. It is the entire combination of the

claim limitations taken as a whole that constitutes both the novelty and non-obviousness of applicant's claims.

7. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Examiner's Comment

Priority

8. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

9. Applicant's instant application filed July 5th 2005 is a national stage entry of **pct/us03/18952**. Applicant's instant application filed July 5th 2005 is also a CIP of US application **10//177, 618** filed June 20th 2002, and issued to **Kruspe et al.**, January 18th 2005 as US patent **6,844,727 B2**. The US patent **6,844,727 B2** is a CIP of US patent **6,452,388** filed June 28th 2000, issued to **Reiderman et al.**, September 17th 2002. However, because the features of the magnetic core formed from a material having a "high internal magnetostrictive damping" and "low magnetostriction" are not aspects of the parent US application 09/605,463 which is now US patent 6,452,388 issued to **Reiderman et al.**, September 17th 2002, Applicant cannot rely on the filing date of the parent **Reiderman et al.**, application for priority. The priority date for these above-mentioned features is the filing date of the instant CIP application of June 20th 2002.

Terminal Disclaimers approved

A) The **terminal disclaimer** filed **January 8th 2007**, which ties the instant application to US patent **6,452,388 B1** Issued September 17th 2002 to **Reiderman et al.**, has been approved and made of record.

B) The **terminal disclaimer** filed **January 8th 2007**, which ties the instant application to US patent **7,084,625 B2** issued August 1st 2006 to **Kruspe et al.**, has been approved and made of record.

C) The **terminal disclaimer** filed **February 15th 2007**, which ties the instant application to US patent **6,844,727 B2** issued January 18th 2005 to **Kruspe et al.**, has been approved and made of record.

10. The double patenting issues from the last office action of **September 8th 2006** are rescinded in view of the timely filed terminal disclaimers noted above.

Information Disclosure Statement

11. The initialed and dated information disclosure statements submitted on **12/15/2004** and **9/15/2005** were previously attached to the office action of **September 8th 2006**.

Drawings

12. The examiner approves the drawings submitted **January 8th 2007**.

Response to Arguments

13. The examiner notes that because **Reiderman et al.**, WO 02/01256 published January 3rd 2002, is applicant's own grandparent application, of the instant application, based on the priority information provided by applicant in the **January 8th 2007 response** the rejections of **Claims 19-20, 23-26, 35, and claims 36-42** under **35 U.S.C. 102(a)** as being anticipated by **Reiderman et al.**, WO 02/01256 published January 3rd 2002, as well as the rejections of **Claims 21, 22, and 27-34** under **35 U.S.C. 103(a)** as being obvious over **Reiderman et al.**, WO 02/01256 published January 3rd 2002; are **rescinded as having been overcome**, due to the fact that the applied reference has now been disqualified as prior art against the pending claims.

14. The examiner notes that because **Reiderman et al.**, US patent **6,452,388 B1** is applicant's own parent application, of the instant application, based on the priority information provided by applicant in the **January 8th 2007 response** the rejections of **Claims 19-20, 23-26, 35, and claims 36-42** rejected under **35 U.S.C. 102(e)** as being anticipated by **Reiderman et al.**, US patent **6,452,388 B1** issued September 17th 2002, filed June 28th 2000, as well as the rejections of **Claims 21, 22, and 27-34** under **35 U.S.C. 103(a)** as being obvious over **Reiderman et al.**, US patent **6,452,388 B1** issued September 17th 2002, filed June 28th 2000; are **rescinded as having been overcome**,

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due to the fact that the applied reference has now been disqualified as prior art against the pending claims.

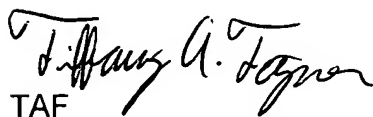
15. Additionally, the examiner notes that a terminal disclaimer connecting the instant application and the **Reiderman et al.**, US patent **6,452,388 B1** was filed on January 8th 2007.

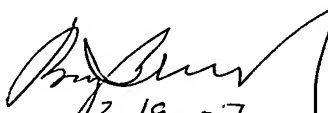
Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

17. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(571) 273-8300**.

18. Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system Status information for published applications may be obtained from either Private PMR or Public PMR. Status information for unpublished applications is available through Private PMR only. For more information about the PMR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PMR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


TAF
February 17, 2007


12.19.07
BRJ SHIVASTAV
PRIMARY EXAMINER